

5. Visual Assessment

5.1 Introduction

This chapter provides an assessment of the visual impact of the additional three wind turbine generators proposed for the Woodlawn Wind Farm project.

The key aspects of the visual assessment include:

- a review of the context of the proposed changes to the wind farm development
- a review of the visual catchment of the modified Woodlawn Wind Farm layout
- preparation of simulated views of the wind farm. The simulations depict the additional turbines from four representative viewpoints to enable comparison with the simulations presented in the previous SEE (Aurecon 2010). The significance of this impact is then assessed.

5.2 Overview of assessment

The visual assessment for the approved project (May 2010, based on the 2010 SEE) was based on the following characteristics:

- 20 Suzlon S88 (2.1 MW) wind turbines
- wind turbine hub height of 80 m
- wind turbine rotor diameter of up to 88 m
- off-white turbine colour
- a 33kV overhead transmission line from the Woodlawn Wind Farm to the Capital Wind Farm substation
- access tracks and cable trenches located on the ridgeline

This assessment considers the significance of the visual impact from the proposed additional three turbines and the overall cumulative impact. The additional turbines will be located on the southern extent of the wind farm at elevations ranging between 810 and 840 ASL.

The visual assessment undertaken for the original EIS (URS 2004) identified six landscape units for the Woodlawn wind farm, based on consistency in landform, vegetation, structure and land use. These landscape units were subject to further review in early 2010 (Aurecon 2010) and remain unchanged. They are listed in Table 5.1. Further discussion of these landscape units is provided in the Woodlawn Wind Farm EIS (URS, 2004).

Table 5.1 – Landscape units (URS, 2004)

Landscape unit	Wind farm portion	Viewed from
1	South-west	Taylors Creek Road
2	North-west	Intersection of Taylors Creek Road and Collector Road
3	North-west	Federal Highway to the west of Lake George
4	North-east	Collector Road
5	Eastern	Bungendore Road
6	South-east	Goulburn-Bombala railway line

The site visibility assessment for the approved project indicated that:

- part or all of the turbines will be visible from most viewpoints within 5 km
- significant topographic screening occurs for viewpoints at 5-10 km for some directions, eg to the north, east and parts of the south-east and south-west

- the largest group of the general public with prominent views to the wind farm will be motorists using the Bungendore Road for a distance of about 10 km with generally intermittent or partly screened views to the wind farm
- turbines will be visible on the skyline from a 9 km section of Collector Road and a 12 km section of Taylors Creek Road. The visibility from Collector Road will decline from moderate to low with increased distance from the wind farm.
- approximately 47 rural residences will be located in the 10 km visual catchment, with 39 within 5 km of the nearest turbine. Of these:
 - Four residences are located on Woodlawn and Pylara properties, both currently owned by Veolia and regarded as wind farmer residences
 - Approximately 38 are neighbours to the wind farm with about 28 residences located to the south and west of the wind farm along Taylors Creek Road

The methodology adopted for the visual impact assessment included the following steps:

- Review of landscape analysis for the wind farm site and surrounding area
- Review of identified changes to the approximate visual catchment of the wind farm
- computer modelling to generate simulated perspective view of the modified wind farm layout
- photomontage compilation for revised layout
- comparison of photomontages for proposed array and approved array
- development of visibility assessment criteria
- review of photomontage using visibility assessment criteria
- review of indicative visibility for a range of other potentially relevant viewpoints including residences
- review of mitigation options for the amended project

The key aspects of the visual impact review are summarised in the following sections.

5.3 Wind farm visual characteristics

The general location and the associated landscape characteristics of the wind farm remain unchanged. However, the extent of the wind farm has changed with the number of turbines increasing from 20 to 23. The original wind farm proposal in 2004 included 25 wind turbines prior to modification of the proposal in 2010.

The three additional turbines are proposed to be located along the ridgeline at the southern extent of the approved wind farm. The proposed new turbines will be Suzlon S88 2.1 MW turbines, the same turbine type to be used for the approved wind farm.

As with the approved turbines, generator transformers will be located close to the base of the wind turbine towers with low overall height and colour selection to blend in with the local landscape. Ancillary works include access tracks and underground power and control cables between turbines (Figure 1.3). The key characteristics of the additional turbines and associated ancillary works potentially affecting visual impact are provided in Table 5.2 below.

Table 5.2 – Wind farm components and key visual characteristics

Wind farm component	Visual characteristic
Turbines	
Number of turbines	3 (in addition to the 20 approved turbines)
Tower and hub height	- Steel tubular supporting towers 80 m hub height - Tower 4.5 m at base and 2.5 m at top
Turbine	- Three bladed - Rotor diameter of 88 m (44 m blades)
Turbine rotation (rpm)	15.5 revolutions per minute
Colour	Matt white colour or similar light neutral colour
Generator transformer	To be located near the base of each turbine – green / tan
Electrical works	
Electrical connection	Underground power and control cables will interconnect the individual turbines and have minimum visibility once easements are revegetated
Access works	
Access tracks	Up to 10 m wide and unsealed

The additional access tracks will be at ground level and will generally not be visible from surrounding viewpoints. Where practical, the works will be designed and constructed to minimise visibility through positioning, earthworks formation and revegetation of disturbed ground.

5.4 Landscape analysis

The wind farm is located on a visually prominent north-south ridgeline elevated above the adjacent rural lands. The additional three wind turbines are proposed to be located on the southern extent of the array. The maximum height of the ridgeline is 930 m. The additional wind turbines will have a footing height of between 810 and 840 m.

A broad valley associated with Taylors Creek catchment extends approximately 6 km to the west of the ridgeline. It is a subdued topographic feature with rolling hills and patchy areas of trees.

The landscape to the east of the ridge is more variable in elevation. It is characterised by valleys and ridges associated with the Mulwaree River and Crisps Creek Catchments. The undulating landform and presence of established trees provides some screening of the wind farm from various directions and viewpoints.

The Woodlawn site and surrounding areas are established agricultural areas with most of the original woodland vegetation cleared and pasture established for grazing. Fencing divides the area into regular shaped paddocks. Farm tracks provide access from public roads to scattered homesteads throughout the area with most of the homesteads having shelter trees planted around them. Sheds and stockyards are common. Remnant trees occur along sections of creek lines, road sides and as isolated patches.

There are rows of planted generally exotic species such as pines forming wind breaks that are visually prominent elements in parts of the landscape particularly to the south and west of the site. Exotic trees are also generally associated with homesteads.

Lake George is located about 10 km to the west of the site and is a major visual feature of the landscape. Views from the section of the Federal Highway running along the western edge of Lake



George towards the wind farm are approximately 18 km distant from the Woodlawn ridgeline. This section of the Federal Highway also includes views of the Grose Hill, Ellenden and Hammonds Hill Groups of turbines that form the Capital Wind Farm.

The generally north south running road between Tarago and Bungendore is located to the east of the site and is a significant regional tourist route. Collector Road is located north of the site and runs between the Federal Highway and the Tarago/Bungendore Road. It is lightly used by the local residents and to a lesser extent tourists. The Canberra to Sydney railway line is located to the east of the site and generally follows the course of the Mulwaree River with limited views to the wind farm site.

Views towards to the proposed wind farm from public roads vary from open, filtered and screened. Screening elements adjacent roads include planted trees, remnant native vegetation and elevated areas of landform, which reduces the overall visibility of the project for travellers on the surrounding roads.

The former Woodlawn mine site, located at the northern end of the approved wind farm, is a visible element below the ridgeline. The mine site includes some revegetated overburden spoil piles of moderate height and lower elevation bare areas including tailing dams left after mining. Buildings in the locality of the approved site include rural residential properties, agricultural structures and existing communications infrastructure.

All of the landscape elements have been influenced by human activities, particularly clearing and agriculture. Overall viewer perception would be one of a typical rural landscape.

The representative photomontages included in this Chapter provides an appreciation of the landscape elements and the visual impact of the proposed addition of three turbines to the approved project as indicated by photomontages included in the January 2010 SEE (Aurecon, 2010).

5.5 Landowner consultation

Woodlawn WindEnergy Joint Venture undertook extensive consultation with the local community during the preparation of the 2004 EIS. Consultation activities have also occurred to provide relevant stakeholders with information regarding the previous variations to the development, the potential impacts of previous variations, including visual impact. Information in relation to the proposed addition of three new turbines to the approved project has been provided to relevant stakeholders.

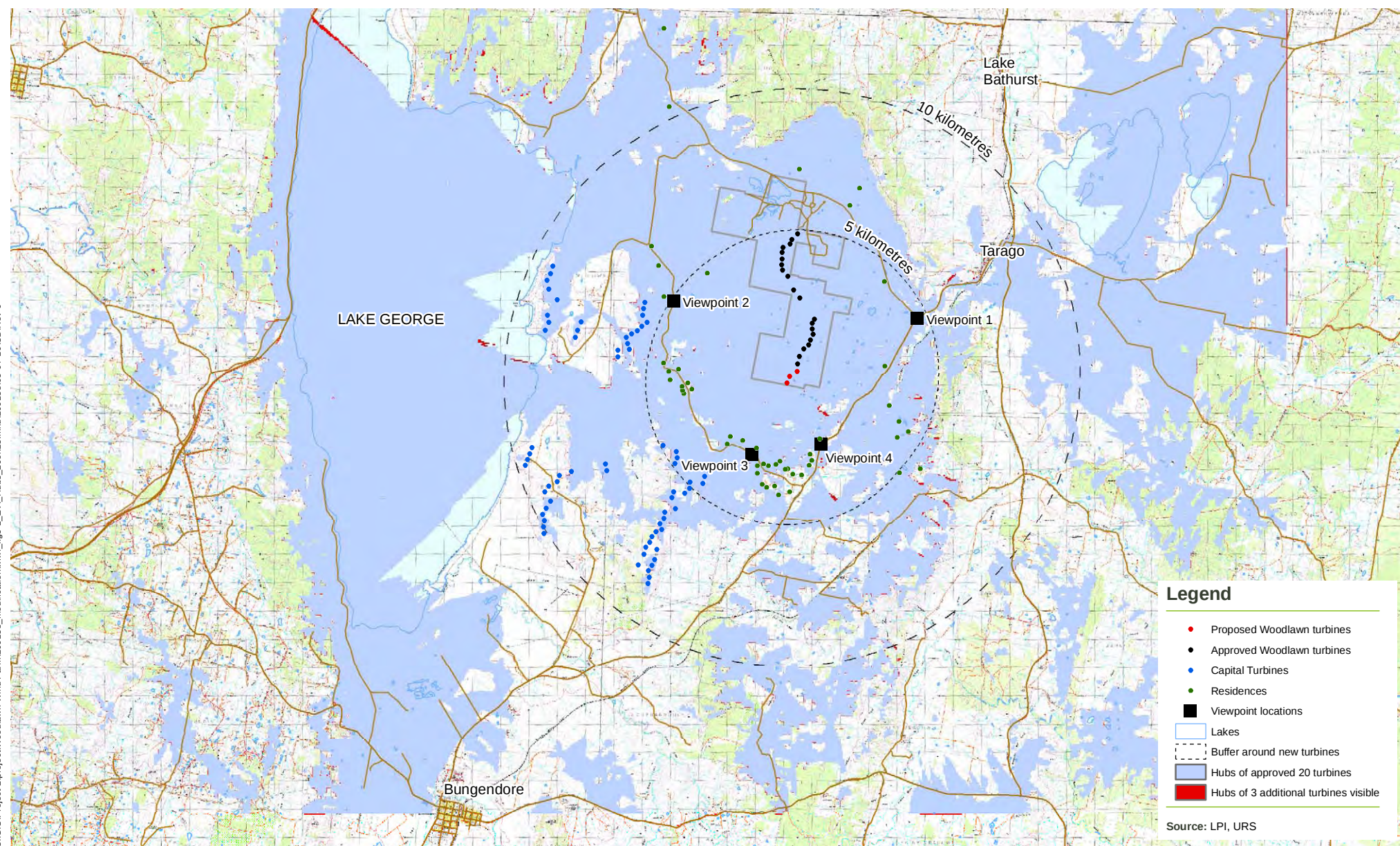
5.6 Visual Catchment of the wind farm

The visual catchment or Zone of Visual Influence (ZVI) of a wind farm is defined as those locations in the surrounding landscape where the wind turbines may be wholly or partly visible. The visual catchment of Woodlawn Wind Farm was determined out to a distance in excess of 20 km using a Geographic Information System (GIS) that accessed topographic data and the wind farm model (turbine location and height) to map the areas from which the wind farm will be either partially or fully visible.

Figures 5.1 and 5.2 provide a comparison between the ZVI of the approved 20 turbine wind farm layout and the proposed layout consisting of 23 turbines. The GIS layers have been arranged to highlight any additional wind farm visibility triggered by the additional three turbines. This has been calculated for the visibility of turbine hubs (Figure 5.1) and the visibility of tips of the turbine blades (Figure 5.2). This analysis illustrates that there is little variation in visual catchment when the three additional wind turbines are added to the approved layout. Figures 5.1 and 5.2 also include reference lines showing approximate distances of 5 km and 10 km respectively from the additional turbines (distance to nearest turbine of the three additional turbines).

The effect of screening by trees or built structures was not included in the computation of the visual catchment as data was not available for the relevant heights. Accordingly, the computed visual catchment will overestimate the extent of the wind farm's visual catchment.

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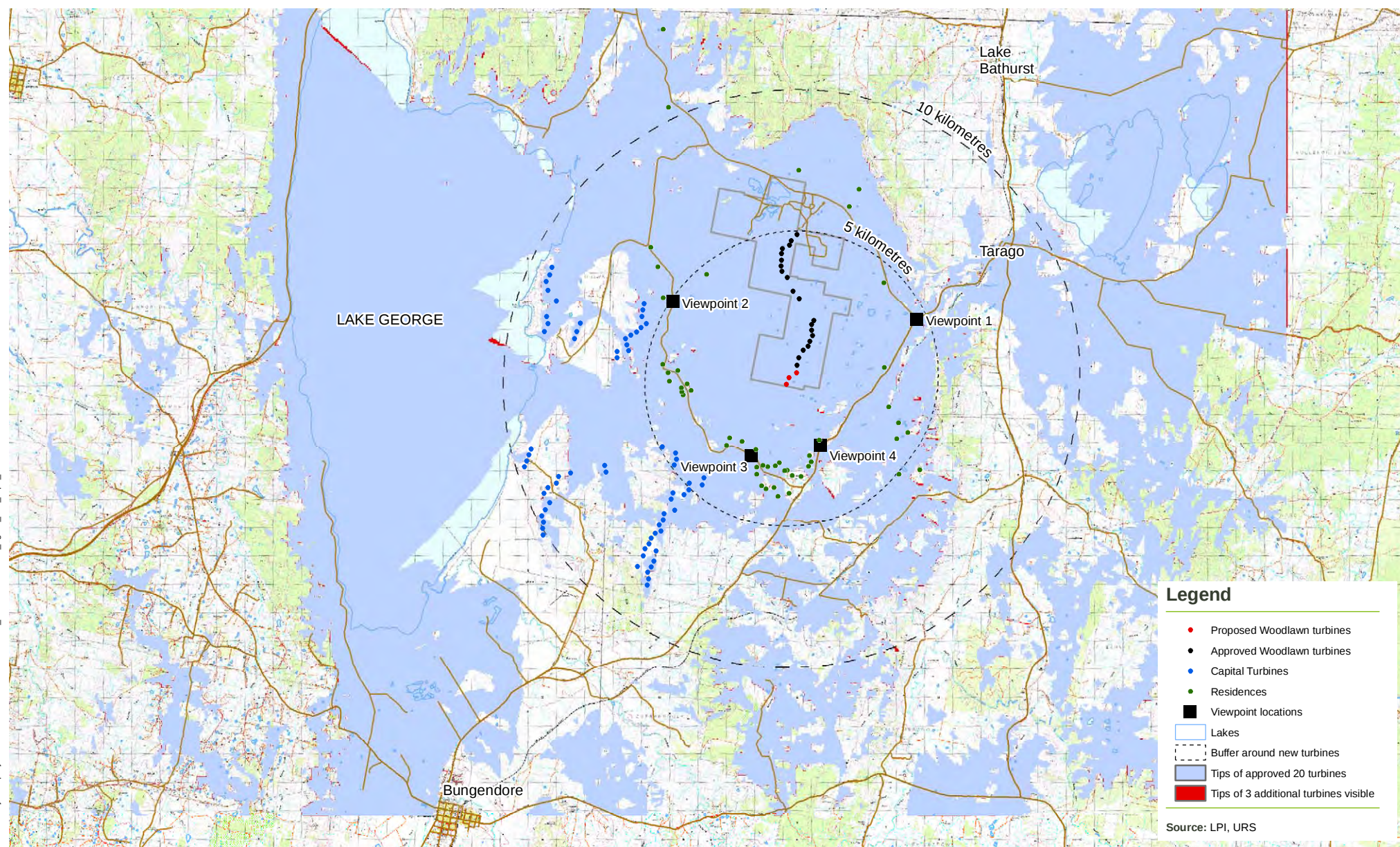
SCALE 1:185,000 @ A4
0 3 6 km

Projection: MGA
Note: Screening by trees and others structures has not been taken into account

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FIGURE 5.1: ZVI - Hub Visibility of approved 20 turbines over proposed 23 turbines

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SCALE 1:185,000 @ A4
0 3 6 km

Projection: MGA
Note: Screening by trees and others structures has not been taken into account

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FIGURE 5.2: ZVI - Blade Tip Visibility of approved 20 turbines over proposed 23 turbines

A site inspection was conducted to gain an understanding of the visual catchment of the wind farm. Roads which surround the project area were travelled and the areas from which the turbine sites could potentially be seen were noted. It was found that the turbines would be visible over a large area but that local topography and vegetation will limit visibility from many locations. In particular, localised ridges will limit views of the proposed wind farm from some residences immediately to the west of Tarago-Bungendore Road and along Taylors Creek Road to the south.

The turbines will be visible at distances greater than 10 km in some directions. The visual impact of the overall Woodlawn Wind Farm, including the additional turbines, beyond about 10 km, while noticeable, is predicted to be minor. For many viewpoints at distance, the distinction between the Capital and Woodlawn Wind Farms may not be evident. As a result, the overall effect of the additional three turbines on the visual catchment of the wind farm will be negligible.

5.7 Visual impact assessment sites

The objective of this assessment is to provide enhanced photographic images (photomontages) to enable the visual impact the impact of the additional three turbines to be compared with the visual impact of the approved the wind farm.

Four representative viewpoints were selected for the visual impact assessment. Three of these viewpoints were already used in the January 2010 SEE and the photomontages have been reviewed and updated accordingly (Table 5.3). An additional viewpoint was selected for analysis to represent the impact of the new turbines on the nearest residence. Figures 5.1 and 5.2 show the locations of the viewpoints.

Table 5.3 – Selected viewpoints for photomontage review

Viewing location (2010 SEE)	Viewing location (Jan 2010 SEE)	Description of viewing location
Site 1	Viewpoint 1	View from the crest of Bungendore Road at intersection with Collector Road looking west towards the site on the skyline – Plate 5.1
Site 2	Viewpoint 4	View from Taylors Creek Road looking south to east across grazing paddocks scattered with bands of trees in the mid distance and the site forming on the skyline – Plate 5.2
Site 3	Viewpoint 5	View to north from Taylors Creek Road near RFS Shed with rural distance in the mid ground and ridgeline in the far distance – Plate 5.3
Site 4	New Viewpoint	View from Bungendore Road close to the entrance of the Glendale property – Plate 5.4

Three existing photomontages assessed in the January 2010 SEE (Viewpoints 1, 4 and 5) have been reviewed and updated to include the three additional turbines (Plates 5.1 to 5.3). The additional Viewpoint was included in the assessment to capture the visual impact at the nearest residence, to the south-east of the wind farm.

The photomontages were used to determine the visibility of the proposed additional three turbines relative to the approved 20 wind turbine layout. The co-ordinates of the viewpoints are provided in Table 5.4 below together with the distance to the nearest turbine.

Photomontages have been prepared for the representative viewpoints (Table 5.4) and visibility of the wind farm classified (Table 5.5). The photomontage for the various locations will assist the visual assessment of the additional three turbines.

Table 5.4 – Details of viewpoint assessment sites

Ref site #	Viewpoint location (see Figure 5.2)			Viewpoint details	
	Easting MGA (m)	Northing MGA (m)	Description of location and plate number	Dist. nearest turbine (km)	Direction of view
1	738755	6113349	Intersection of Collector and Tarago to Bungendore Roads – Plate 5.1	3.6	west
2	730134	6113964	Taylors Creek Road, between Euroka and Sunnybrook residences – Plate 5.2	4	east
3	732893	6108527	Taylors Creek Road near Bonnie Doon Residence and RFS shed – Plate 5.3	2.8	north
4	735357	6108905	Bungendore Road near Glendale residence – Plate 5.4	2.5	north-north-west

The Tarago township is at an elevation of about 700 m and approximately 6.5 km north-east of Woodlawn Wind Farm. As there are intervening hills of over 800 m height between Tarago and the wind farm the bulk of locations within the township will not provide views of Woodlawn Wind Farm with the additional three turbines as evident in Figure 5.1 and 5.2.

The Lake Bathurst township (9 km to the north-east) and the Bungendore township (19 km to the south west) also have topographic screening and will not have views to the Woodlawn Wind Farm with the additional three turbines.

5.8 Production of photomontages for selected viewpoints

Photographic representations (photomontages) of the landscape with the wind turbines superimposed were prepared for the approved project (Aurecon, 2010). Views most affected by the proposed additional turbines were reviewed and updated to assist with the assessment of visual impact.

The objective of the photomontages is to provide an accurate simulation of the appearance and scale of the modified wind farm in comparison to the approved wind farm layout in the landscape.

The production of the photomontages entailed the use of computer modelling software (WindFarmer) to produce updated perspective diagrams from selected viewpoints and provide accurate representations of the wind farms with the additional wind turbines in relation to the topography.

The photomontages were prepared using a computer based graphics system that enabled incorporation of scaled images of the turbines into the respective photographic images. The appearance of the turbines has generally been enhanced in the photomontages to aid recognition of the respective turbines.

The photomontages created with the additional three turbines have been presented with the photomontages prepared for the approved wind farm, allowing a comparison to be made between the two layouts. The photomontages form a principal reference by which the Approval Authority and the community can gain an appreciation of the likely visual impact of the proposed modification to the wind farm from relevant viewpoints in the surrounding area.

The orientation of the wind turbines will vary with the wind direction however, for most of the time they are likely to be facing east or west into the predominant wind directions. The views of the wind turbines will look different, depending on the orientation of the turbine relative to the viewpoint. To maximise the impact of the turbines in the individual photomontage they have been shown generally facing the viewpoint even though that situation will be uncommon. The photomontages prepared to illustrate the effects of the proposed additional turbines are shown in Plates 5.1 to 5.4 at the end of this chapter.

5.9 Visibility assessment

A complete discussion of the visibility assessment of the approved wind farm is provided in the January 2010 SEE (Aurecon, 2010) and the earlier EIS (URS, 2004). The visibility of the development with the additional three turbines was reviewed against the following assessment criteria:

- the distance from the wind farm (for the nearest wind turbine)
- the spatial extent of the visible turbines (referred to here as the wind farm view angle)
- the number of turbines visible

For the purpose of this assessment, the following descriptors were adopted.

High Visibility:	Scenes having high visibility include viewpoints within 1 km and viewpoints up to 3 km depending on the wind farm view field angle.
Low Visibility:	Low visibility is assigned to all viewpoints beyond 5 km and viewpoints between 3 km and 5 km depending on the wind farm view field angle. It should be noted, however, that low visibility does not necessarily correspond to low visual impact.
Moderate Visibility:	This classification is applied to viewpoints intermediate between the low and high classes.

While the above classification scheme is somewhat arbitrary, it does serve to rank visibility for the respective viewpoints. It is stressed that visibility rankings do not represent the visual impact which is subject to a range of other considerations. Similarly, the visibility ranking does not indicate whether the visibility is adverse or favourable.

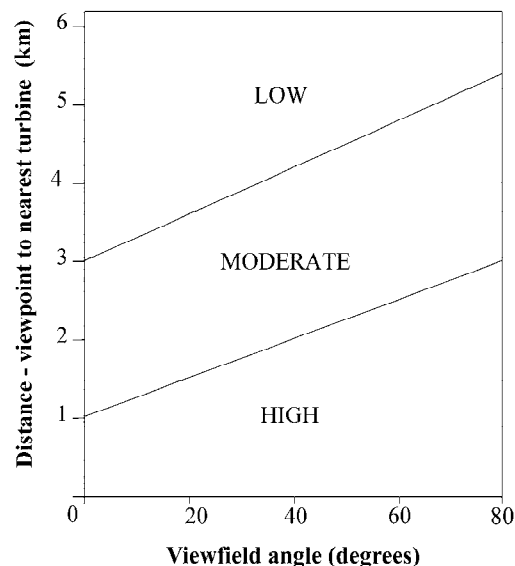


Figure 5.3 – Classification of wind farm visibility

The key visibility criteria and the resulting classifications for each viewpoint are shown in Table 5.5. All four viewpoints have been rated as having a moderate visibility of the wind farm.

Table 5.5 – Visibility assessment results – representative viewpoints

Ref site #	Viewpoint location	Number of visible turbines			Visibility criteria		
		For-ground	Mid ground	Back ground	Distance to nearest turbine	Wind farm view angle	Visibility class
		1–3 km	3–5 km	> 5 km	km	degrees	
1	Intersection of Collector and Bungendore Roads – Plate 5.1	0	14	9	3.6	59	Moderate
2	Taylor's Creek Road, near Sunnybrook residence – Plate 5.2	0	18	5	4	62	Moderate
3	Taylor's Creek Road near Bonnie Doon Residence – Plate 5.3	1	9	13	2.8	16	Moderate
4	Bungendore Road near Glendale residence – Plate 5.4	4	8	11	2.5	22	Moderate

As highlighted in the January 2010 SEE, there are very few trees along the ridgelines where the turbines will be located and, therefore, little to reduce or soften their image. At other locations, such as residences and along roadsides, trees, topography or other features may reduce the visible portion of the wind farm. Many local residences are surrounded by trees to provide a degree of shelter. These trees may partially obstruct views of the wind farm from the residence. More expansive views of the wind farm may be available beyond these tree screens often within short distances from the residence.

For many viewpoints surrounding the wind farm, the turbines are silhouetted against sky and when cloud cover is present, it may reduce the level of visual impact when compared to that of clear sky.

The amended wind farm layout with the additional three turbines will be noticeable in the surrounding landscape, however, as discussed in Section 5.6 the difference in visibility will be marginal in comparison to the approved layout. Turbine visibility will be primarily dependent on the distance of the viewpoint from the wind farm, the proportion of the view occupied by the wind farm and any screening that may be present for the viewpoint.

Even though the wind turbines are prominent features they will not significantly mask the elements of the various scenes, and as there are turbines in the immediate vicinity, the scene's character will not significantly change. Furthermore, there will be large areas of adjoining landscape which will remain unchanged by the proposed modification to the approved wind farm.

A qualitative review of the indicative visibility at a range of other locations, particularly residence, was also undertaken to assist stakeholders to evaluate the visibility if the wind farm with the additional turbines at locations of interest to them. The additional viewpoint was selected as a result of this analysis.

Table 5.6 – Review of indicative visibility of Woodlawn Wind Farm for viewpoints from neighbouring residences within 3 km of the additional three turbines

Location	Nearest turbine	Wind farm view angle	Distance to nearest turbine	Estimated overall visibility class	Screening by trees	Nearest photomontage	Comment on potential visibility factors
	number	degrees	km	L, M, H	Yes/No/Partial		
Wroxham	23	32	2.5	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
Bonnie Doon	23	26	2.5	M	No	Viewpoint 3	
Rosehill	23	19	3	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
Hilltop Farm	23	18	2.9	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
Myolena	23	18	2.8	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
Richmond Grove	23	24	2.65	M	Partial	Viewpoint 4	Partial screening by trees around homestead may reduce visibility
Glendale	23	34	2.3	M	Partial	Viewpoint 4	Partial screening by trees around homestead may reduce visibility
Torokina	7	86	2.65	H	Partial	Viewpoint 2	Partial screening by trees around homestead may reduce visibility
Kildare	15	75	2.8	M	Partial	Viewpoint 4	Partial screening by trees around homestead may reduce visibility
Elward's	23	20	2.9	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
H23	23	40	2.7	M	Partial	Viewpoint 3	Partial screening by trees around homestead may reduce visibility
H34	23	37	2.7	M	Partial	Viewpoint 4	Partial screening by trees around homestead may reduce visibility

5.10 Visual issues associated with ancillary works

Ancillary works for the proposed additional turbines will include variations to existing access tracks and the installation of underground cabling. The visual impact of the ancillary works will generally be insignificant in comparison to the installation of the additional turbines and they will be designed and installed so as to reduce their visual impact, where practicable.

The additional access tracks will be undertaken to achieve suitable grades on stable slopes and designed so that they will not exacerbate erosion on the site. Any temporary tracks which are not required for ongoing maintenance will be removed and re-grassed after construction works have been completed.

To reduce visibility at the locations of the turbines, the 33kV cables linking the additional turbines to the approved wind farm will be placed underground along the ridge tops. The cabling route will follow the access road route. Once the cables have been installed in trenches, they trenches will be backfilled and the disturbed area will be restored with topsoil and grass.

For further information on the visibility of the approved Capital Wind Farm, refer to the Capital Wind Farm Environmental Assessment and supplementary assessments (Connell Wagner PPI, 2006; Connell Wagner, 2008; Connell Wagner, 2009).

5.11 Shadow flicker

Shadow flicker is a visual effect that occurs when rotating turbine blades cause intermittent shadowing as the blades momentarily block the sun's path. The effect will occur under circumstances where the turbine location is such that at certain times of the day the sun's rays pass through the swept area of the rotating blades and affect the viewpoint. The effect is diminished by distance between the turbine and the viewpoint, by increased cloud cover and when the turbine is facing at an angle to the rays of the sun and the blades present a narrower profile and reduced shadowing.

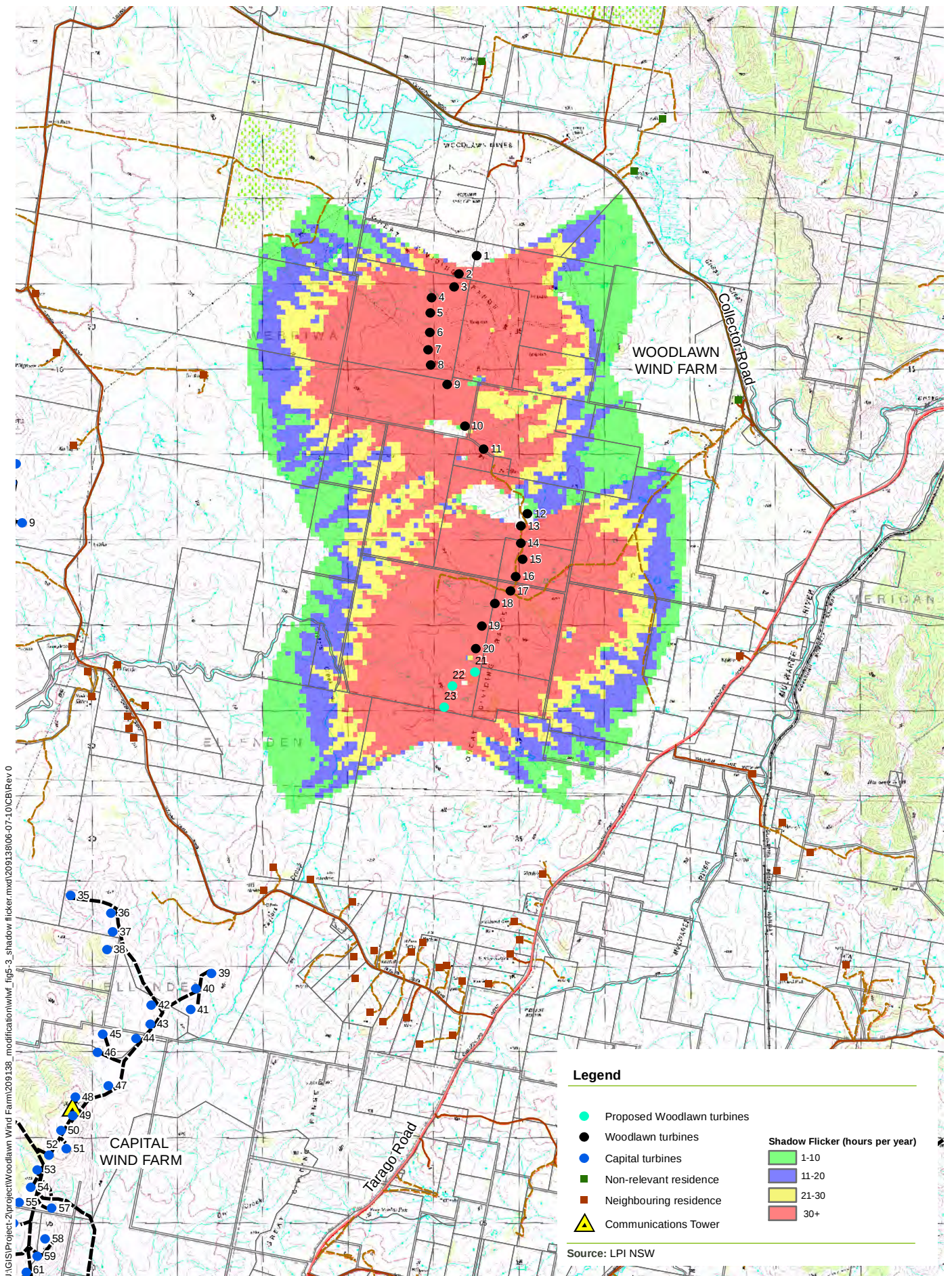
The shadow flicker frequency range is based on the 9 to 19 rpm rotation speed of the three-bladed rotor and was estimated to be between 0.45 Hz and 0.95 Hz (URS, 2004). This was considered to be well below the ranges identified for potential human health effect (URS, 2004). The three additional turbines, which are identical with the machines of the approved project, have an estimated rotation speed 15.5 rpm and are within the assessed range.

Shadow flicker effects at distances greater than 1 km are also considered to be minor (i.e. indistinct and very faint). At a distance of less than about 400 m between a turbine and a residence, there is the potential for the sun to be completely blocked by blades of 3.5 m width, although only intermittently. At this distance, shadowing by the tips of the blades will be less prominent and more diffuse than for the wider section of the blade near the hub (Connell Wagner, 2006 and 2008).

The closest neighbouring residences to the Woodlawn Wind Farm are located 2.3 km (Glendale) and 2.5 km to the south (Wroxham and Bonnie Doon), 2.6 km (Torokina) to the west, 2.8 km (Kildare) to the south-east, therefore the shadow impact on these residences is expected to be negligible. The closest windfarmer residence is 2.1 km (Cowley Hills) to the north-east of Woodlawn wind farm.

Aurecon has revised the shadow flicker study based on the 23 turbine Woodlawn Wind Farm layout. The result is illustrated in Figure 5.4. Similar to the approved 20 turbine configuration, neighbouring residences are beyond the distance where shadow flicker effect will extend and neighbouring residences to the south of Woodlawn Wind Farm would not be affected. Consequently, the additional three turbines will not result in any significant increase of shadow flicker impacts.

No public roads or public places will be significantly affected by shadow flicker as a result of the proposed additional turbine in the Woodlawn Wind Farm array.



SCALE 1:60,000 @ A4

0 1 2km

Projection: MGA Zone 55

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FIGURE 5.4: Shadow Flicker Analysis

5.12 Blade glint

Blade glint refers to the regular reflection of sun off one or more rotating turbine blades. This can be a temporary effect at any particular location, though the vast bulk of any glint occurs where the viewer is located above the altitude of the turbine hub. The occurrence of blade glint depends on a number of conditions including the orientation of the nacelle, angle of the blade, and the angle of the sun. The reflectivity of the surface of the blades is also important, and is influenced to some extent by colour and age of the blade.

Blade glint is an aspect that could be a potential distraction to drivers if roads are aligned towards turbines, particularly where the road is located at a higher altitude to the turbine hub and can be noticed over some distance, as much as 10 to 15 km. While the effect may be noticeable at distance, its impact is regarded as transient and very low.

Blade glint is not expected to represent a significant issue for the proposed modifications due to the altitude of the turbines relative to potential view points, low density of settlement in the areas that could be potentially affected and the low volumes of traffic on the local roads that are near to the turbine sites. In addition, all turbines will be painted with an off-white non-reflective paint that assists to avoid blade glint to occur. As a result, the effects of blade glint will be no more than minor and of short term duration at the most.

5.13 Mitigation of visual impact

The three bladed turbine design and the chosen non-reflective off-white colour is generally accepted as being the most visually acceptable turbine arrangement and colour. However, due to their size and prominent position the wind turbines will be difficult to screen at the site. Existing trees and other features at some surrounding locations may partially obstruct views of the wind farm.

Measures to further mitigate the visual impact of the additional turbines that have been proposed to be incorporated in the wind farm development will include:

- Use of underground cabling between wind turbines
- Access roads located to limit their visibility, to the extent practicable
- Selected tree planting on site may be undertaken to reduce the visibility of certain elements of the wind farm
- Tree planting at some neighbouring properties may be undertaken
- A non-reflective matt finish will be applied to blades if practicable
- No external night lighting will be associated with the relocated turbines

5.14 Conclusions

The Woodlawn Wind Farm will be noticeable from many points within its visual catchment. However, the addition of three turbines to the southern extent of the wind farm will not result in any significant increase of visual effects. The photomontages provide a set of representative views from the neighbouring viewpoints with generally clear views to the turbines. Aurecon has clearly marked and labelled the additional turbines in the new photomontages and has also provided pictures of the approved wind farm configuration for a direct comparison. The photomontages should assist stakeholders to make their own assessment of the visual impact of the proposed change.

Where practicable, ancillary works will be implemented with due consideration to reducing their visual impact and in most cases they will have a minor contribution to the project's visual impact.

Potential visual impacts and the wishes of the property owners and neighbours have been addressed and adverse effects have been avoided or minimised wherever possible. While minor adjustments may be made when positioning the turbines, such adjustments are unlikely to alter the overall visual impact described in this assessment.

Based on the assessment conducted, it is concluded that the proposed additional three turbines will not result in any significant change to the overall visual impact of Woodlawn Wind Farm as approved by the Minister for Planning in May 2010.



Visual Simulation (Aurecon 2009)

Additional Turbines



Updated Visual Simulation (Aurecon 2010))



Visual Simulation (Aurecon 2009)



Updated Visual Simulation (Aurecon 2010)



Visual Simulation (Aurecon 2009)

Additional Turbines



Updated Visual Simulation (Aurecon 2010)



Visual Simulation for Approved Wind Farm (20 turbine array)



Updated Visual Simulation for 23 turbine array